MULTIMEDIA UNIVERSITY STUDENT IDENTIFICATION NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2019/2020

BDS 2074 – MANAGEMENT DECISION SCIENCE

(All sections / Groups)

16 OCTOBER 2019
9.00 a.m. - 11.00 a.m.
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This Question paper consists of **FOUR (4)** pages with **FOUR (4)** Questions only.

2. Answer **ALL** the questions. All questions carry equal marks and the distribution of the marks for each question is given.

3. Please write all your answers in the Answer Booklet provided .

QUESTION 1 [25 Marks]

a) Consider the following problem:

Maximise $Z = 6X_1 + 7X_2 + 10X_3$

Subject to $2X_1 + 5X_2 + X_3 \leq 50$

$X_1 + 2X_2 + 3X_3 \leq 30$

$X_1, X_2, X_3 \geq 0$

Construct the **initial** simplex table for the problem. **[8 marks]**

b) The **optimal** simplex table for a linear programming problem is given in the following table:

Cj →		12	15	14	0	0	0	
↓	SOLUTION MIX	X_1	X_2	X_3	S_1	S_2	S_3	QTY
?	S_1	0	0	-1	1	2	-3	11
?	X_2	0	1	1	0	1	-0.5	20
?	X_1	1	0	0	0	-1	1	5
	Zj	?	?	?	?	?	?	?
	$Cj - Zj$	?	?	?	?	?	?	

where X_1, X_2 and X_3 are the number of units of product 1, product 2 and product 3 respectively.

S_1, S_2 and S_3 are the slack variables for labour hours in Department 1, Department 2 and Department 3 respectively.

i) Complete the optimal simplex table. **[8 marks]**

ii) Determine the optimal production level and maximum profit. **[4 marks]**

iii) The company is considering hiring additional labour on a part-time basis at a rate of RM2.89 per hour in Department 3. Is it worthwhile to do so? Please explain the reason. **[3 marks]**

iv) Which resource is not fully utilised? **[2 marks]**

Continued...

QUESTION 2 [25 marks]

a) Jack's company produces computers in plants located at towns A, B and C. The computers are sent to warehouses at different locations U, V and W. The shipping costs vary as given in the following table, as well as the supply and demand units.

From	To			Supply
	U	V	W	
A	$50	$40	$60	400
B	$30	$45	$40	300
C	$60	$35	$30	300
Demand	200	450	350	

Formulate an initial feasible solution to the transportation problem, by using the Northwest Corner Method. Then evaluate each unused shipping route by computing all improvement indices using Stepping Stone Method.

[15 marks]

b) Eric's consultant firm has four accountants to be assigned to four different projects. Using Hungarian Method, find the projects that should be assigned to the accountants that will minimise the total time (in number of days) to complete all the projects.

	Project			
Accountant	W	X	Y	Z
Alex	10	10	9	7
Benny	8	9	8	11
Chandra	12	14	10	9
Doris	11	13	9	12

[10 marks]

Continued...

QUESTION 3 [25 marks]

Dolmat Sdn. Bhd. has a farming project that consists of six activities. The activities that must be accomplished in order to complete the project are listed as follows:

Activity	Weeks			Immediate Predecessors
	Optimistic time, *a*	Most likely time, *m*	Pessimistic time, *b*	
A	8	9	10	-
B	5	7	9	A
C	6	10	14	B
D	5	6	7	A
E	7	9	11	B, D
F	1	2	3	C, E

a) Construct a network diagram for this problem. **[6 marks]**

b) Determine the expected time, variance, Earliest Start time (ES), Earliest Finish time (EF), Latest Start time (LS), Latest Finish time (LF) and slack for each activity. **[13 marks]**

c) Determine the critical path to complete the farming project. **[2 marks]**

d) Calculate the variance and the expected completion time of the farming project. **[4 marks]**

Continued...

QUESTION 4 [25 marks]

a) State one difference between decision-making under uncertainty and decision-making under risk. **[4 marks]**

b) Soh's Company is trying to set the piece for one of its new products. Three pricing schemes A, B and C have been suggested. The estimated sales volume under the demand levels of high, average and low is indicated in the following payoff matrix.

Pricing Scheme	Levels of Demand, Payoff (RM)		
	High	Average	Low
A	1600	1400	1000
B	1400	1300	800
C	1250	1100	600

Determine the choice of pricing scheme using the following decision criteria:

i) Maximax payoff **[3 marks]**
ii) Maximin payoff **[3 marks]**
iii) Equally likelihood payoff **[5 marks]**
iv) Hurwicz's criterion of realism with $\alpha = 0.6$ **[5 marks]**
v) Minimax regret criterion **[5 marks]**

End of paper.